

Using Remotely Sensed Data and Watershed and Hydrodynamic Models to Evaluate the Effects of Land Cover Land Use Change on Aquatic Ecosystems in Mobile Bay, AL

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Alabama coastal systems have been subjected to increasing pressure from a variety of activities including urban and rural development, shoreline modifications, industrial activities, and dredging of shipping and navigation channels. The impacts on coastal ecosystems are often observed through the use of indicator species. One such indicator species for aquatic ecosystem health is submerged aquatic vegetation (SAV). Watershed and hydrodynamic modeling has been performed to evaluate the impact of land cover land use (LCLU) change in the two counties surrounding Mobile Bay (Mobile and Baldwin) on SAV stressors and controlling factors (temperature, salinity, and sediment) in the Mobile Bay estuary. Watershed modeling using the Loading Simulation Package in C++ (LSPC) was performed for all watersheds contiguous to Mobile Bay for LCLU scenarios in 1948, 1992, 2001, and 2030. Remotely sensed Landsat-derived National Land Cover Data (NLCD) were used in the 1992 and 2001 simulations after having been reclassified to a common classification scheme. The Prescott Spatial Growth Model was used to project the 2030 LCLU scenario based on current trends. The LSPC model simulations provided output on changes in flow, temperature, and sediment for 22 discharge points into the estuary. These results were inputted in the Environmental Fluid Dynamics Computer Code (EFDC) hydrodynamic model to generate data on changes in temperature, salinity, and sediment on a grid throughout Mobile Bay and adjacent estuaries. The changes in the aquatic ecosystem were used to perform an ecological analysis to evaluate the impact on SAV habitat suitability. This is the key product benefiting the Mobile Bay coastal environmental managers that integrates the influences of temperature, salinity, and sediment due to LCLU driven flow changes with the restoration potential of SAVs. Data products and results are being integrated into NOAA's EcoWatch and Gulf of Mexico Data Atlas online systems for dissemination to coastal resource managers and stakeholders.